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SCIENCE NEWS LETTER

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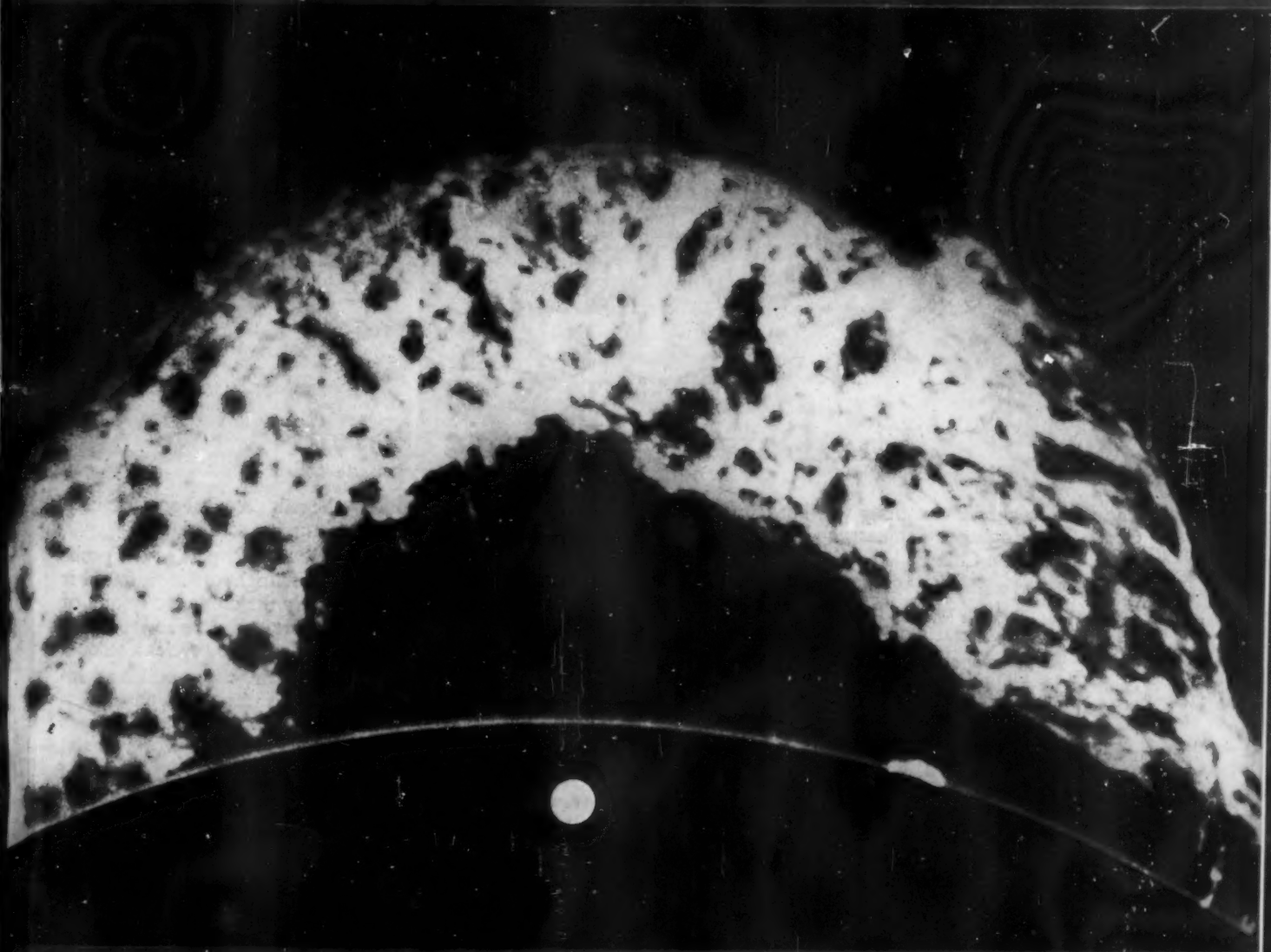
THE WEEKLY SUMMARY OF CURRENT SCIENCE • SEPTEMBER 14, 1946



Sun Prominence

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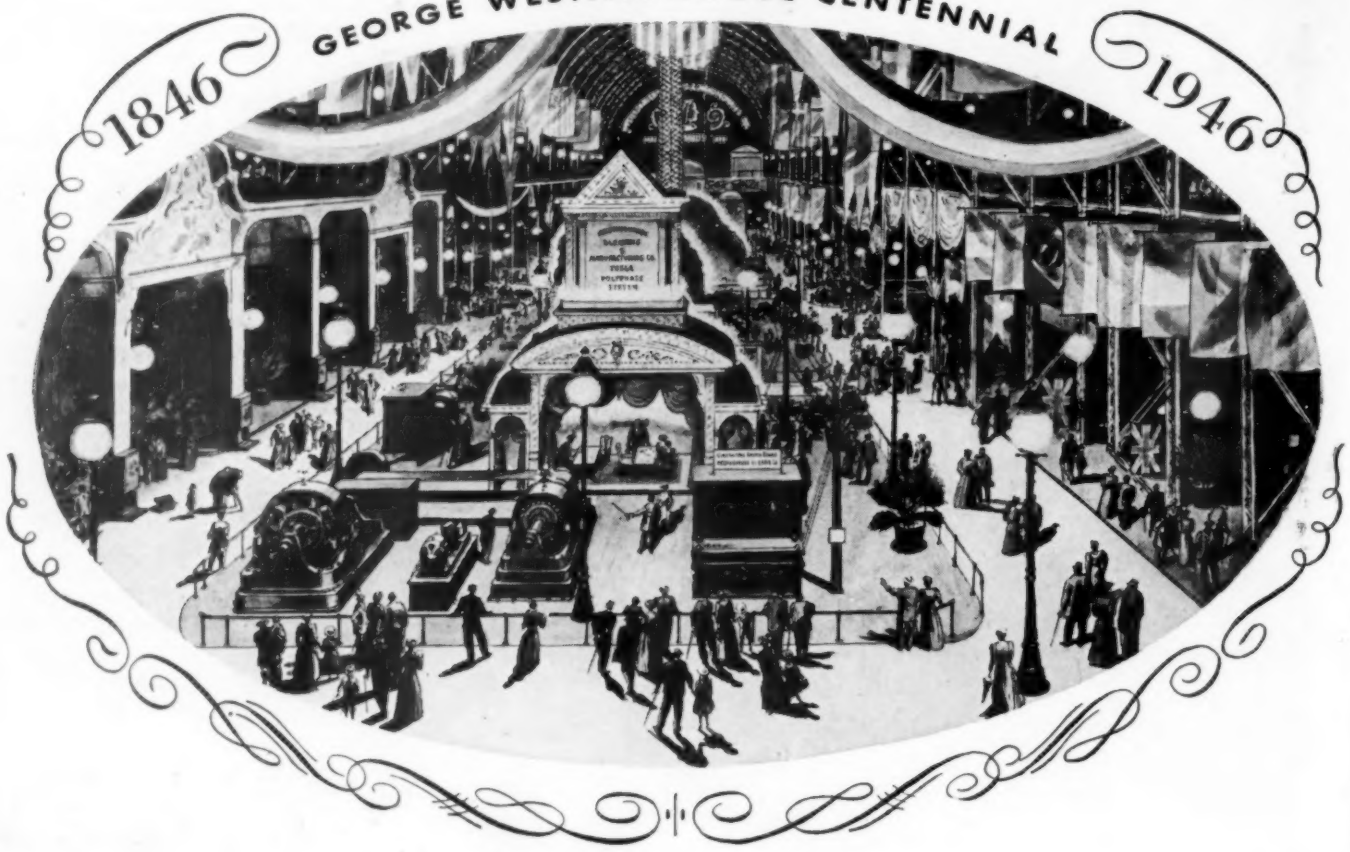
A SCIENCE SERVICE PUBLICATION

1921 TWENTY-FIFTH ANNIVERSARY 1946



The Dawn of Electric Power

The modern age of electricity was born in 1893, when George Westinghouse demonstrated the *first integrated a-c system* at the Chicago World's Fair.

Some years earlier, in 1886, Westinghouse had proved the *practicability* of transmitting alternating current *over a distance* . . . at Great Barrington, Massachusetts.

However, a critical problem had yet to be solved before electricity could become the universal servant of mankind. The first step—sending alternating current over considerable distances—immediately spotlighted the need for the next step . . . devising a means to utilize a-c current as an economical power source at the point of use.

George Westinghouse tackled this problem with characteristic energy. With the help of Nikola Tesla, he developed the *induction motor*—the only practical power source for driving machinery by alternating current.

But the induction motor solved only part of the problem. For efficient operation, Westinghouse soon found it necessary to *redesign completely* the crude a-c system of that day . . . to perfect a *polyphase generator* and to establish our present frequency standard of 60 cycles a second.

Culminating these efforts, Westinghouse built and installed induction motors, transformers, a polyphase generator and a completely integrated a-c transmission system —in a sensational exhibit at the Chicago World's Fair!

It was the *dawn of electric power* . . . the forerunner of electrical equipment that is today serving mankind — in industry, in our homes and on our farms.

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

TODAY... The Westinghouse Electric Corporation makes hundreds of types of electric motors for thousands of uses. They range in size from tiny, fractional hp motors to the mammoth 40,000 hp unit that powers the 400-mile-an-hour wind tunnel at Wright Field . . . *the largest rotor-wound induction motor ever built.*

Tune in: TED MALONE — Monday, Wednesday, Friday, 11:45 am, EDT, American Network

CHEMISTRY

ACS Reports Marvels

Chemists tell of research that resulted in the "discovery" of fluorine during the war, the speeding up of penicillin production and the dehydration of garbage.

➤ A NEW CHEMICAL element, not one of the excessively rare fissionable metals of atomic bomb fame, but a light non-metal, as common as carbon, nitrogen or chlorine, has in effect been discovered during the war years and is the subject of a number of papers given at the meeting of the American Chemical Society in Chicago. The element is fluorine, actually known as a curiosity for nearly 200 years, but so corrosive, dangerous and difficult to handle that until now chemists have let it alone as much as possible.

Separation of the uranium isotopes was accomplished by using uranium fluoride, the only gaseous compound of that heavy metal. For its production, quantities of the element fluorine had to be made and stored ready for use. Since the only common use for fluorine up to that time, the etching of glass, depends upon fluorine's ability to eat glass and make it disappear in the form of a gas, the first problem was to find materials which would make satisfactory containers for this extremely active element.

Carbon Steel Containers

Chemists from university laboratories and industrial plants who took part in the cooperative researches which solved the most immediate problems on handling fluorine on a large scale reported to the American Chemical Society meeting that tanks and pipes of carbon steel were found practical, with electrodes of carbon to lead the electric current into the solution from which the fluorine is to be extracted and nickel electrodes at the poles where the corrosive gas is drawn off. The employment of modern automatic gas-handling machinery using high pressures and low temperatures, sometimes as low as that of liquid nitrogen, made possible the production of this new chemical. One of the subjects of research had to be methods for disposal of waste fluorine.

Out of the new interest in this active element have come new lubricants for airplanes and automobiles which are much less sensitive to temperature changes than the natural oils and greases formerly available. Many other new compounds are available whose properties will fit them for uses not satisfactorily filled by present-day materials. To the chemist, these offer an exciting field for new experiment, for they nearly double the already enormous array of compounds, both organic and inorganic, with which he works.

To the chemist, fluorine belongs to the family of halogens, or salt-formers. Other members of the family are chlorine, familiar as antiseptic and bleach; bromine, now mined from sea-water for use in making anti-knock compounds for gasoline; and iodine, heaviest and most metallic of the group, which is dissolved in alcohol to make the familiar antiseptic tincture. Besides etching glass, fluorine commonly appears as sodium fluoride, a household insecticide.

Penicillin Production

Penicillin production by molds can be speeded in essentially the same way shipbuilding by men was speeded during the war—the subassembly method. Subassembly in shipbuilding meant bringing to the shipyard a whole bow, a whole stern, a whole cabin, already put together elsewhere and letting the workers weld them into place. Subassembly in penicillin production means putting into the molds' culture solution chemical compounds containing groups of atoms already arranged in patterns known to exist in penicillin.

Success with this method was reported before the meeting of the American Chemical Society by Dr. F. G. Jarvis and Dr. M. J. Johnson of the University of Wisconsin. They were able to increase the production of penicillin G by adding phenylacetic acid, which contains a ring of atoms characteristic of this particular penicillin variety. For a different penicillin, designated as X, the best subassembly molecule was that of p-hydroxyphenylacetic acid.

Two other University of Wisconsin scientists, Dr. Kiyoshi Higuchi and Dr. W. H. Peterson, reported on a bacterial assay for the various kinds of penicillin. Three bacterial species respond differently to each of three different penicillins, so that their behavior in the presence of a mixture of penicillin "unknowns" gives an index to what is in it.

Coming Up: Dehydrated Garbage

Dehydrated foods we all heard plenty about during the war. New, however, is the idea of dehydrated garbage, presented before the chemists by Dr. W. A. Bush of the California Flaxseed Products Company of Los Angeles.

After the 82% or so of water is removed, the speaker stated, the remaining dry matter contains materials that can be used to advantage as fertilizers. And if the garbage can be collected in sufficiently fresh condition, as would be the case at hotels, hospitals, etc., it can be made to yield greases suitable for soap-making and other technical uses,

AAF photograph

MAN-MADE ANTENNA—The Army Air Forces uses radar antenna such as this to measure the height of thunderstorms. This antenna rocks back and forth, recording on a scope the echoes returned by the thunderstorm and giving valuable data on the storm's structure. Part of the equipment is being used in the joint AAF-Navy-Weather Bureau at Orlando, Fla.

and a meal suitable for livestock feeding produced from the residue.

Soil Chemistry

Botanists can give chemists some useful pointers when it comes to finding out what's wrong with a given area of soil, Prof. Walter S. Eisenmenger of Massachusetts State College indicated in an address before the meeting. A man with a well-trained eye for plants can tell, by the presence or absence of certain species, a good deal about the chemical state of affairs down at root level.

In general, wild plants are more sensitive indicators of soil chemistry than cultivated plants, Prof. Eisenmenger stated, and he attributed this to the long centuries since he first tamed them. Among the wild plants, the species farthest down on the ladder of evolution are the most responsive.

Fissionable Matter

A preview of what plenty of fissionable materials can do towards revolutionizing everyday life was provided by a paper presented at the meeting by Dr. C. L. Comar and Dr. George K. Davis of the University of Florida. They demonstrated by means of "tagged" atoms of artificially radioactive cobalt that this element, needed in minute amounts to keep animals healthy, must be supplied to cattle constantly because they have no way of storing reserve supplies of it in their bodies.

The cobalt used in these experiments was made radioactive in a cyclotron, but larger supplies at much lower cost should soon be made available as the country's U235 and plutonium production facilities become available for turning out radioactive elements for scientific research purposes. Not only the relatively minor element cobalt but also such elements as phosphorus, calcium, potassium and sodium, all of major importance in animal and plant physiology, should soon be available cheaply and in quantity for use in experiments designed to answer old riddles in life processes, and to make the answers significant in increased food production and better health.

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INVENTION

Optical Canes to Aid Blind

➤ A BLIND MAN, using a seeing-eye optical cane, may soon be as familiar a sight on crowded city sidewalks as the uncertain tapping of a blind man's stick or the gentle tugging of a seeing-eye dog.

An experimental sensory aid for the blind that uses a beam of light to accurately detect the distance and direction of all obstacles within 20 feet is being perfeced by the Signal Corps Engineering Laboratories, Bradley Beach, N. J. It cannot be called radar, but it is like radar in which visible light is used instead of short radio waves.

The size of a loaf of bread, a nine-pound case carried in one hand is connected by a short wire to a single earphone. Trees, people, steps, and other obstacles in the path of the blind user are heard, instead of seen, as coded "dots" and "dashes".

In scanning his surroundings, the blind person turns the case slowly from side to side so that the beam of light projected from the front of the case can reflect any obstacle it meets. The reflected beam of light is changed by a photoelectric cell into coded tone signals in the blind user's earphone.

With a little practice a person could easily determine the exact distance, to within one foot, of obstacles on a city street or in a room strewn with furniture. His sense of hearing allows him to learn to recognize the code signals. While a reflection from an object 11 feet distant produces a tone signal of one "dash", and a reflection from eight feet distant produces a signal of two "dots", a reflection from an object 10 feet distant produces a strong "dash" and two weaker" "dots", and a reflection from nine feet produces a weak "dash" and two stronger "dots". The time of travel of the reflected light determines the sound code.

Although the Signal Corps is already producing a few test models for continued experiments, optical canes for the blind cannot be produced commercially until the present apparatus is perfected.

As yet, the device would be of little help to a blind person in crossing streets, since a speeding vehicle would not be detected until it was within 20 feet of him. Before the seeing-eye device is introduced to the public, it will be made lighter and equipped to detect small objects, such as narrow posts and hanging wires.

The problem of filtering out signals from sunlight and ordinary electric light used for illumination has been solved by making the optical cane sensitive only to pulsed light, and then pulsing the beam of light emitted by the case to that exact frequency.

Research is continuing under the direction of Lawrence Cranberg, a civilian Army physicist, who designed the first model.

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MEDICINE

AAF Devices Fight Polio

New development is useful only for bulbar infantile paralysis that affects breathing. Only a few such cases usually occur in an epidemic.

➤ THE LATEST development in polio fighting, although apparently life-saving in some cases, will prove disappointing to many anxious parents whose hopes may have been raised by reports of "the greatest single advance in 50 years in the fight against polio."

It does not answer all the problems in polio, according to authorities at the National Foundation for Infantile Paralysis. It is useful only for cases of bulbar infantile paralysis. These are the ones in which the respiratory or breathing center in the brain is affected and they often end fatally. The number of bulbar cases in any epidemic, however, is usually small.

The new development consists in use of Army Air Force equipment developed to protect men against oxygen lack at high altitudes and to give artificial respiration in the cramped space of a plane where ordinary methods were impractical if not impossible.

Although optimistic about the new development in polio fighting, Dr. M. B. Visscher, of the University of Minnesota, where it was first tried, said that he and his group are not yet ready to make any statement about results and have not made any statement. Physicians who are very happy with the results have made some comments.

The National Foundation for Infantile Paralysis authorities stated the new development has been used so far in 20 patients. All but one survived. Four or five would have been expected to die at the usual 20% to 25% fatality rate in bulbar polio. The only death was in a patient whose parents refused permission for the new treatment until too late.

A tiny light that clips on the ear lobe is one of the new weapons being used against polio. This device with filters measures the amount of oxygen circulating in the blood. It was invented for the AAF by Dr. Glenn Millikan of the University of Pennsylvania. With a recording tape it gives a continuous measure of oxygen level in the blood and was used, among other times, to show AAF trainees going through the altitude chambers the need for wearing oxygen masks at high altitudes. The device is painless and does not require taking even a drop of blood from the patient.

With this device doctors can tell immediately when the patient is even slightly lacking in oxygen, instead of having to wait for clinical symptoms such as cyanosis, or blueness of lips and skin, by which time the patient's oxygen need is very great and his condition poor.

When oxygen is needed, the University of Minnesota doctors make use of another AAF device, kept very "hush-hush" during the war, called the pneumatic balance resuscitator, to supply oxygen at the rate needed.

Earlier than usual use of tracheotomy is said by National Foundation authorities to be another feature of the Minnesota treatment. This operation consists in cutting a hole into the patient's trachea and inserting a tube for breathing. When a patient with bulbar polio loses his swallowing reflex, he is in danger of choking on the mucus accumulating in the larynx above the trachea. The operation removes this danger.

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INVENTION

Fire-Resistant Cloth Is Also Water-Proof

➤ FABRIC that is at once fire-resistant and water-repellent can be made by a process on which U. S. patent 2,406,779 has been granted to John L. Kurlychek of Orange, N. J.

Fire-resistant clothing has long been made of woven asbestos, but most of this is thick, clumsy and not waterproof. Lighter asbestos cloth can be made by mixing about one-fourth cotton into the fiber; but this cotton remains inflammable. Mr. Kurlychek's solution is to impregnate the cotton with a metallic compound that renders it flame-resistant and at the same time makes it able to shed water.

The compounds favored by the inventor are soaps of the heavy metals, for example zinc. These are insoluble chemical relatives of ordinary washing soaps, except that the latter contain lighter metals, usually sodium, and of course are soluble in water. The fabric is first soaked in a chemical solution of the heavy-metal soap, the solvent is wrung out, and the fabric then mildly heated to melt the soap into its fibers. Fabrics thus treated can be repeatedly dry-cleaned without losing their dual resistant properties.

Patent rights are assigned to the United States Rubber Company.

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EDUCATION

Better Science If Teachers Better Paid

➤ CHARGING that there is more financial incentive for a young man to seek to be a milkman or janitor than a high school science teacher, Dr. Paul E. Klopsteg, chairman of the American Institute of Physics, declares that American youth cannot be properly educated for an atomic age until teachers are paid higher salaries.

"Teachers' salaries have advanced little in recent years, while incomes in other occupations have risen by leaps and bounds," he said, adding, "The discrepancy between teachers' salaries and incomes in other occupations is much wider in the United States than in other countries.

"We cannot hope to retain or advance our scientific superiority in the dawning atomic age unless this weakness in our society is overcome," Dr. Klopsteg warned.

He reported surveys showing that the average teacher salary is about $1,500 a year, and most high school teachers receive less than $2,000.

"Many milk deliverers receive more than twice as much in wages and commissions," the educator pointed out.

Predicting a critical shortage of both scientists and science teachers for many years, Dr. Klopsteg said that improved high school science training is needed both to interest young people in science and to acquaint all students with science as a basis for good citizenship in the modern world.

Urging higher teaching standards, he concluded, "Better teaching requires higher salaries."

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RADIO

From Milky Way to Earth

Radio signals may have originated in the gas and dust between the stars of the Milky Way, radio survey of the universe reveals.

➤ RADIO signals which have been on their way to us for hundreds and thousands of years may have originated in the clouds of gas and dust that fill much of the spaces between the multitude of stars in the Milky Way, Grote Reber of Wheaton, Ill., told members of the American Astronomical Society meeting in Madison, Wis.

A sheet-metal mirror 31.4 feet in diameter and 20 feet in focal length was the chief apparatus used by Mr. Reber in his radio survey of the universe. This mirror focuses the long-wave radio radiation which it collects from a systematic scanning of the sky. Radio waves originating outside the earth, called "cosmic static," were discovered about 15 years ago by K. G. Jansky of the Bell Telephone Laboratories.

In the radio receiver the cosmic static appears as a hissing sound similar to the boiling of a teakettle. At 160 megacycles the sound is definitely very strong in the direction of the Milky Way. The eccentric position of the sun in the Milky Way galaxy, near the edge in the constellation of Perseus, is confirmed by the weakness of the cosmic static in that direction as compared with its greatest strength in the direction of Sagittarius, toward the center of the Milky Way.

The sun, too, gives off radio radiation, and it is easy to predict how strong it should be at our distance away from the sun. Mr. Reber stated that the observed "static" from the sun agreed well with that theoretically predicted. The other stars in the Milky Way must give off radio radiation too, but their tremendous distances weaken it so much that it is only sufficient to account for an insignificant part of the observed "cosmic static." There must be some other origin for this strong radio energy coming from the direction of the Milky Way, and Mr. Reber proposes that it originates in the depths between the multitude of stars.

Toward the center of the Milky Way, in Sagittarius, clouds of obscuring matter are very prominent, and these same interstellar clouds causes lanes and rifts to be apparent in many other regions of the Milky Way, especially in the directions of Cygnus, Cassiopeia, Canis Major and Puppis, where secondary maxima in cosmic-static intensity have been found by the Wheaton scientist. He proposes that the mechanism for producing these radio impulses is what physicists call free-free transitions of energy.

Free-free transitions result when one particle of matter, most probably an electron which has escaped from an atom, passes another atom and loses some of its energy but is not captured. The electron may pass the nucleus of a hydrogen atom, slow it down a bit or change its direction, and the energy lost will be radiated into space as a pulse of radio energy. These free-free transitions, in the low density of interstellar gas, may be of rather low energy, so the radiation would appear appropriately as long-wave radio energy rather than as the comparatively short waves of light.

The intensity of cosmic static, as measured by Mr. Reber's apparatus, is quite high for the frequencies used by long-distance short-wave commercial stations, somewhat weaker at frequencies used by FM broadcasting and television stations, faint at the lower radar frequencies, and below perception on the best equipment designed for the higher radar frequencies. Therefore, such apparatus as was used to bounce a radar beam off the moon cannot be used to study cosmic static.

It is proposed that a station similar to that at Wheaton be established in a low latitude to enable observations of the portions of the Southern Milky Way invisible at Wheaton—areas in which lie some of the most dense regions of both stars and interstellar clouds. Also, Mr. Reber proposes that conditions in the tail of a comet may resemble, from a radio standpoint, those in an interstellar cloud, so that were a bright comet with a large tail to pass our way an excellent opportunity would be provided to make closehand observations and to verify his theory.

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BACTERIOLOGY

New Antibiotic Source Is Dead Forest Litter

➤ NEWEST source of antibiotics, or penicillin-like substances, is forest litter, the mass of dead and decaying leaves that lie under the trees. Discovery of several antibiotic compounds in litter composed of leaves of maple, birch, beech, ash, poplar, oak and elm is reported by Dr. Elias Melin and Dr. Torsten Wiken of the University of Upsala.

Although apparently formed by mold action, these substances are most effective in checking the growth of molds, especially of soil fungi. One, however, which was extracted from dead maple leaves, proved effective against Staphylococcus aureus, the yellow pus germ of common boils.

Details of the work of the two Swedish botanists are given in the British scientific journal, *Nature* (Aug. 19).

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ASTRONOMY

Gigantic Prism Is En Route to Telescope

➤ A 300-POUND glass telescope prism, the biggest ever made, was completed in Connecticut for installation in the world's largest Schmidt-type telescope at the Observatorio Astrofisico Nacional, in Mexico. It will be used for auxiliary equipment to photograph stellar spectra more than 100,000 times fainter than the faintest star visible to the naked eye.

The prism was ground and polished by the Perkin-Elmer Corp., at Glenbrook, Conn., from a 379-pound optical glass molded at the Bausch and Lomb Optical Company of Rochester, N. Y. The new prism exceeds by three inches the next largest one of its kind. This is in the Schmidt-type telescope at the observatory of the Case School of Applied Science in Cleveland, Ohio.

Without such an objective prism, a star image is but a dot. With the prism, each dot becomes a thread-like spectrum. This spectrum may be observed through a view telescope, or recorded on a photographic plate for future study. From the spectrum lines, scientists are able to ascertain the elements in the atmosphere of a star, its degree of ionization and its surface temperature.

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PUBLIC HEALTH

Senate Group Aids Health

Report of subcommittee tells about attempts to cut the nation's $8,000,000,000 annual sickness and accident bill.

➤ HOW A SENATE subcommittee labored for three years to improve national health and cut the nation's more than $8,000,000,000 annual sickness and accident bill is revealed in a report by Sen. Claude Pepper, of Florida, chairman of the subcommittee on health and education.

Working with him on the subcommittee were the following Senators: Elbert D. Thomas, Utah; James E. Murray, Mont.; Lister Hill, Ala.; James M. Tunnell, Del.; Robert A. Taft, Ohio; George D. Aiken, Vt.; H. Alexander Smith, N. J.; and Wayne Morse, Ore.

If you are a white collar worker and had your salary raised to meet increased costs of living in 1944 or 1945, you have this committee, in part, to thank for it. As a result of a special hearing to investigate the health and economic problems of Americans with fixed incomes resulting from the wartime increased cost of living, the subcommittee recommended that the War Labor Board cease applying the Little Steel formula to substandard salaries and wages.

"Hundreds of local governmental units and the Federal Government as well followed by granting cost-of-living wage and salary increases to their employees, as recommended by the subcommittee," Sen. Pepper reports.

If your child stopped running the streets, playing truant and pilfering from neighborhood stores because he was finding fun in a new teen-age club where there was wholesome amusement after school, or if you were able to get aid from a child guidance clinic, you may have the subcommittee to thank. Various of its recommendations on juvenile delinquency, based on hearings, were carried out in local communities by health, child welfare and educational authorities.

You or some member of your family may in future be helped to escape mental illness or to recover from it more rapidly, partly through activities of this subcommittee. Passage of the Mental Health Act to speed research, training and facilities for the control of mental illness followed hearings and a report by the subcommittee.

Among results from other investigations of the subcommittee and its staff, Sen. Pepper lists the following:

Closer collaboration at the community level of various federal agencies through the work of the President's Committee on Congested Areas and expansion of public health work in such areas was effected.

The American people learned the full and shocking truth about the inadequacies of our medical care system and about our generally low level of health compared to what we can achieve.

The need for a broad national program of medical research was revealed.

The subcommittee recommendations for nation-wide expansion and coordination of hospital and health center construction resulted in the passage of the Hospital Construction Act of 1946.

Specific reforms recommended in the subcommittee's report on veterans' health problems were put into effect by General Bradley, the Administrator of Veterans' Affairs.

It aided in the passage by the Senate of a resolution to establish an International Health Organization, an indirect result of which was the formation of a tentative international health organization within the framework of the United Nations.

Disclosure of the pressing problem of ill health of mothers during maternity and of children brought about an increase in the appropriation for maternal and child health and welfare under the Social Security Act.

The American people were informed of the inadequacy of voluntary health insurance plans in meeting the national health problem and of national compulsory health insurance as the most economical and efficient way to assure high quality medical care for all our people.

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FORESTRY

Lumber Shortage Is Bad

➤ PRESENT lumber shortages, a key factor in the nation's housing plans, may get worse rather than better, the Forest Service of the U. S. Department of Agriculture warns. The reason: we are not growing enough trees.

Estimating that the U. S. will need 42,000,000,000 board feet of lumber a year for the next 10 years, the Forest Service declares that "it will be difficult" to push lumber output above 33,000,000,000 board feet each year.

"Meanwhile," the Forest Service predicts, "the average farm or home owner is going to have difficulty getting all the timber he would like to have."

Some wastes can be avoided by better cutting, marketing and milling practices, while protection against fire and pest losses may help some, it was reported.

"But in the long run, we shall have to grow more timber than we do now if we are to supply the needs of a prosperous nation," Service officials said.

Painting a bleak picture of the nation's lumber prospects, the Forest Service reported the regional lumber supply situation as follows:

West: Many established sawmills will run out of logs in a few years. New opportunities for large-scale operations are limited.

North: Timber depletion has shrunk the lumber industry to a small fraction of its former importance.

South: The stand of fast-growing pines is not sufficient to maintain present output.

East: The whole eastern half of the country now has only about as much lumber as the 6% of the forest area in the Douglas fir region of Washington and Oregon.

During the war the U. S. used more timber than was produced, and the nation is still cutting and burning wood faster than trees grow, point out the forest officials.

With a reserve of only 4,000,000,000 board feet of lumber compared with prewar stockpiles of 17,000,000,000, the situation is increasingly critical because of the greater postwar demand.

To achieve an adequate timber supply, the Forest Service proposes a three-point program: 1, public regulation of the forests; 2, public aid to forest owners; and 3, more public forests.

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PHYSICS

Gallium Thermometers Give Direct Readings

➤ GALLIUM thermometers that gave direct readings of temperatures up to 1,200 degrees Centigrade have been discovered in Germany by British scientific investigators. The gallium thermometers showed temperatures which otherwise would have been measured by thermocouples, disappearing filament pyrometers or other indirect means.

Gallium, generally found as an impurity in zinc blends, melts at 30 degrees Centigrade, but it is not very volatile in red heat.

One of the German gallium thermometers was found in the furnace bath of an aluminum reduction plant and another was used in a coke calcining retort. The gallium thermometers consist of a quartz capillary inside a quartz envelope. The capillary contains pure gallium with a slight trace of iron.

A technical report on the thermometers is now available to American scientists.

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CHEMISTRY

Insects Meet Death In Operation "BUGS"

➤ SUCCESS in the Navy's wartime fight to produce a better weapon against malaria-carrying mosquitoes brings to the world a chemical that both kills and repels mosquitoes and other "bugs" and promises better living in peacetime.

The story of "Operation BUGS" was told by Lieut. Comdr. Michel Pijoan when he appeared as guest of Watson Davis, director of Science Service, in Adventures in Science, radio program presented under the auspices of Science Service over the Columbia Broadcasting System.

The new chemical, officially known as NMRI 448, was developed by Lieut. Comdr. Pijoan and Lieut. L. A. Jackowski at the Naval Medical Research Institute at Bethesda, Md. It gets its name from the initials of the Institute and the fact that it was the 448th of many compounds developed by the Institute. In their development theory and chemical structural changes were closely followed with reference to repellent action, Lieut. Comdr. Pijoan said.

The new anti-bug weapon both kills and repels insects. The killing feature is important for ridding an area of insects. The repellent feature gives personal and animal protection.

In the search for a repellent, the Navy scientists had to find a chemical that was powerful, safe and easy to use. It had to be something a man could use himself, cosmetically acceptable and not injure him. In addition it had to be something that would not dissolve in water so that it could not be easily washed off by tropical rains and sweat.

In 448 they found what they were looking for. In the tropics a single application repelled mosquitoes, chiggers, sand flies and bedbugs for a long time. It is effective anywhere from 5 to 13 hours. How effective it will be in temperate climates and for repelling insects from a house or barn is now being investigated.

Science News Letter, September 14, 1946

CHEMISTRY

Paper Mill Waste May Make Yeast

➤ PLANS to use waste sulfite liquor from paper mills in the production of yeast are being developed in Wisconsin. If successful, this program will not only bring added revenue to mills amounting to millions of dollars, but will also do much to eliminate stream pollution in the paper mill areas.

A total of 12 companies, 11 of them Wisconsin paper firms, have organized the Sulphite Paper Manufacturers Committee on Waste Disposal, and are cooperating with the Institute of Paper Chemistry at Appleton, Wis., in research on this subject. A chemist has been sent to Germany to study plants there.

A process has been developed which allows yeast from sulfite liquor to be used for animal feeds, principally poultry at this time, although feeds for cattle are also likely. There is a possibility that foods good for human consumption may be reclaimed from the waste.

The yeast process uses the wood sugars in sulfite pulping liquors, and further research may, it is hoped, find uses for the lignin solution remaining after the sulfite is drawn off. A site is now being sought for an initial reclamation plant for the research.

The Marathon Corporation, one of the cooperating group, is already reclaiming a number of by-products from these wastes, including water softeners, chemicals for aiding concrete mixing, plastics and vanillin.

Science News Letter, September 14, 1946

IN SCIEN

FOOD TECHNOLOGY

Eggs Keep Better In Cool Weather

➤ EGGS will keep better in your refrigerator if they have been kept cool from the time they were laid. From nest to kitchen stove, heat and not humidity threatens egg quality. Since heat aids the growth of bacteria on the shells, a few degrees may make a difference in bacterial growth between Grade A eggs and cheaper ones.

Cover the egg basket with moist burlap to keep eggs cooler. This farm trick is recommended by the poultry specialists of the United States Department of Agriculture. The evaporating moisture leaves eggs cooler, just as evaporating sweat from the farmer's brow leaves him cooler.

Science News Letter, September 14, 1946

NUTRITION

Milking Machine for Guinea Pig Aids Research

➤ SCIENTISTS are after the poor guinea pig again—this time with a milking machine. The machine, smallest milker in the world, is mounted on a board 18 x 6 inches, and Prof. B. L. Herrington, dairy researcher at Cornell University, expects milking guinea pigs to be valuable to nutrition studies.

Milking guinea pigs is a two-man operation, with one person holding the animal, and it takes about 10 minutes. The record milk yield so far is 7.8 grams, or about one-fourth of a fluid ounce, from one guinea pig.

Rats, rabbits and possibly hamsters, a rat-like rodent, may all be milked with the midget milker, using slight adjustments, Prof. Herrington said.

Seeking an experimental animal with a nutrition system and milk with a lactose content all similar to that of humans, the Cornell scientists hit on milking the small laboratory animals.

After the guinea pigs are milked, chemical analyses are made of the milk for lactose, protein, ash content and vitamins. Particular emphasis is being placed on the lactose, important in the manufacture of penicillin.

Science News Letter, September 14, 1946

NCE FIELDS

SEISMOLOGY

New Map Reveals Earth's Structure Below Surface

➤ A NEW underground map of the Caribbean area revealing the structure of the earth down to 500 miles below the surface may come from studying the seismograph records of the recent earthquake off the Dominican Republic, U. S. Coast and Geodetic Survey seismologists disclosed.

With this new picture, a more accurate location will be possible for future quakes in the West Indies. The study, combined with data gathered on the Cuban tremor in February, 1932, will show the speed of seismic waves in the Caribbean area.

Seismologists know that the speed of these quake waves varies in different areas of the world, but a standard figure is now used because information is lacking about the regional differences.

With the new information, seismologists will know more about future earthquakes, but they still will not be able to predict them in advance. The places can be noted that might have quakes, but no one can forecast when they will happen, warn the seismologists.

Science News Letter, September 14, 1946

PSYCHOLOGY

There's More Than Talk Behind Jive Cats' Cracks

➤ TEEN-AGERS' amazing melange of slang, double-talk and wise-cracking serves other purposes than its primary ones of exchanging information and gossip and establishing social contacts, Dr. Mary C. Jones of the University of California told the meeting of the American Psychological Association, in Philadelphia.

In a four-year study of the daily conversation of 200 adolescents, she found that their talk was also used "to release tensions, bolster the ego, and channel aggression." Adolescent language, she stated, "was typically colorful (slangy, idiomatic); highly charged (vituperative, ecstatic); ostentatiously careless; centered largely in personal and interpersonal relationships."

But alas, time takes its toll, even in the golden age between 13 and 17. By the time her chin-happy 200 had reached the estate of high-school seniors the bright bloom of their speech had already begun to fade; they were beginning to use at least a little more ordinary English.

Negro girls from the North make a better showing than their sisters from the South when it comes to college intelligence tests, Dr. S. O. Roberts of Fisk University stated at the same session. He found that the occupations of the girls' mothers appeared to have more influence on their scores than their fathers' occupations.

Science News Letter, September 14, 1946

ENGINEERING

Cruisers Will Be First Of Air-Cooled Fleet

➤ EXPERIMENTAL air-conditioning of two heavy cruisers now under construction will be the forerunner of a virtually completely air-cooled fleet, the Navy indicated.

Denying that the Navy is "trying to mollycoddle its personnel," Vice Adm. E. L. Cochrane, chief of the Bureau of Ships, declared that efficiency and not comfort was the main aim of the program.

"Admittedly the ships will be more comfortable in tropical climates," the Admiral explained, "but that consideration is not paramount."

"It is to improve the battle-effectiveness that this is being done," he said.

Battle experience in World War II showed that long periods in the heat of the tropics lowered efficiency in proportion to the strain and fatigue of ship crews, Adm. Cochrane said.

Emphasizing that all major combatant ships must be air-cooled in the future, the chief of the Navy's Bureau of Ships reported that installations on the new heavy cruisers Salem and Newport News are experiments to determine what type of air conditioning will best meet the Navy's need.

The USS Salem, being built at the Bethlehem Steel Co. shipyard, Quincy, Mass., has steam-jet air-cooling equipment, while the Newport News, under construction at the Newport News Shipbuilding and Drydock Co., Newport News, Va., will use high-speed freon compressors. Both ships are scheduled to be completed late next year.

Science News Letter, September 14, 1946

PSYCHIATRY

Finger-Painting Diagnoses Two Mental Diseases

➤ FINGER-PAINTING, an artistic outlet for young children, can be used to help diagnose and treat two serious mental diseases, Peter J. Napoli, of Binney & Smith Co., New York, told the American Psychological Association at Philadelphia.

Finger-painting revealed distinct differences between patients with schizophrenia and paranoia and between mentally sick and normal persons, Mr. Napoli reported from a study of approximately 900 cases.

In the finger-painting test, an individual's performance is described in terms of his physical behavior and reaction. Such factors as handedness, color, motion, rhythm, texture, balance, order, symbolism and verbalization are considered.

First group tested was made up of patients who had been diagnosed by qualified psychiatrists and psychologists. Schizophrenics and paranoids were found to have sets of definite characteristics.

In later tests, the diagnosis was not made known and the finger-painting revealed patients of the two diseases, as confirmed by physicians after the tests.

Mr. Napoli said that treatment can accompany diagnosis of the mental disorders using the finger-painting technique, a device that encourages self-expression.

Science News Letter, September 14, 1946

CHEMISTRY

New Wax Comes From Lignite, Peat

➤ WAX extracted from lignite and peat, leaving the peat to be used as fuel, is a wartime research result in England. This wax, an ester, served as a substitute for montan wax which is important in the preparation of carbon paper and many polishes. It is useful also as an insulating material because of its hardness and dielectric properties.

About 5% of lignite and 3% to 12% of dry peat can be recovered as crude wax, reports the Department of Scientific and Industrial Research. The wax content of peat depends upon the kind of vegetation from which it was formed. Peats derived from cottongrass, heather and sedges are relatively rich in wax.

Science News Letter, September 14, 1946

ASTRONOMY

Scientists Explore Sun

Photographs show tiny blisters and prominences of threads of gas on the sun's surface. Coronal storms affect short-wave radio broadcasts.

By MARTHA G. MORROW

➤ THE SUN'S outer atmosphere, so faint that it can be seen only during a total eclipse, is no longer a complete mystery. An amazing instrument that eclipses the sun every clear day has shown us that:

The sun's outer envelope is relatively stable and rotates with the sun.

Tiny blisters appearing at the surface of the sun shoot luminous gases outwards.

Three or four days after a fiery storm is seen on the east margin of the sun's disk, shortwave radio broadcasts here on earth, nearly 93,000,000 miles away, are likely to be blacked out.

Prominences, seen as brilliant rosy flames during an eclipse, are composed of interlacing threads of gas.

All this has been discovered through photographs taken high on a Colorado mountain top. Using a telescope that produces man-made eclipses, Dr. W. O. Roberts, superintendent of the High Altitude Observatory of Harvard University and University of Colorado, has learned much about the sun's atmosphere and the way it affects us here on earth.

Lifetimes of Observation

The astronomer who could observe as many as twenty total solar eclipses would set a world record. But even he would have little more than an hour of eclipsed sun in an entire lifetime of study of the sun's outer atmosphere. Several lifetimes of observation, however, are crowded into one clear day at the Climax, Colo., observatory.

The sun is not likely to be hidden entirely by the moon more than once a year. A total solar eclipse that lasts five minutes is considered quite good—an eclipse never lasts longer than seven and a half minutes at best. Only from a tiny strip of earth can people see it as total.

If instruments for photographing eclipses were established in a fixed locality, they could be used for just a few minutes once every 360 years. Yet the sun's corona is studied many hours each clear day at this, the world's highest permanent observatory, more than two miles above sea level.

The prominences and corona represent the atmosphere of the sun just as air forms the earth's atmosphere. The sun itself is composed entirely of gases, but they are so compressed by the great pull of gravity that the sun's surface is sharply defined. The prominences and corona are unstable clouds of gas which sometimes rise as high as 5,000,000 miles above the solar surface.

Prominence of June 4, one of the largest ever photographed, pictured on the cover of this SCIENCE NEWS LETTER, is shown about 200,000 miles above the surface of the sun, blocked out by the metal disk in the telescope. White dot gives the relative size of the earth.

Photographs taken at Climax show that the sun's atmosphere is pulled around with it as it rotates. Bright coronal patches spotted on one limb will be duplicated two weeks later as the same feature passes the other limb.

Even though no spots may be visible on the sun's disk, storms in the earth's ionosphere and disrupted shortwave broadcasts usually follow three or four days after a fiery coronal storm is noticed on the same east margin. Sometimes radio communications are blacked out, and telegraph and electric power circuits completely disrupted. There is seldom any significant geomagnetic activity without bright coronal regions having been located on the east edge of the sun several days previously.

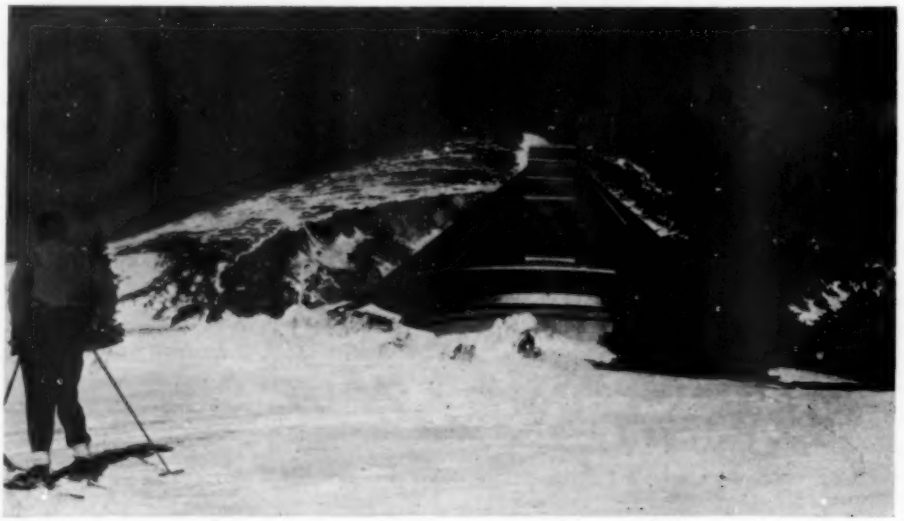
Tiny spike-like prominences have been found on photographs of the sun's outer atmosphere. These spicules usually last only a couple of minutes, never longer than 12. Appearing first as blisters on the sun's edge, a minute or two later they burst, shooting out luminous gases.

Spicules are so frequent that they are thought to form a link between the sun's interior and its corona. It is hoped they will help explain the mystery of the corona's fantastically high temperatures—much hotter than the prominences and much hotter than the surface of the sun itself.

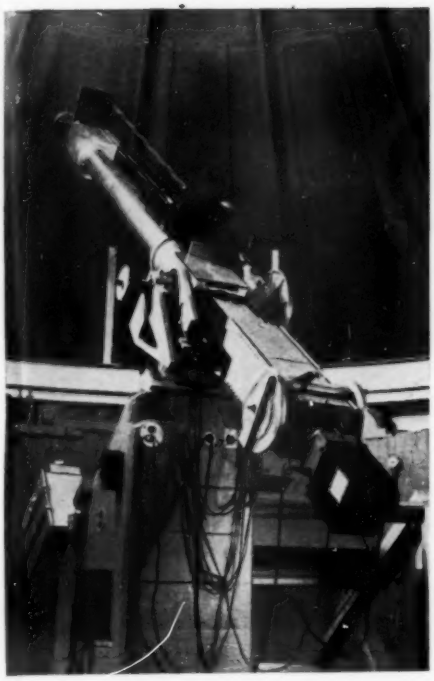
Concept of Prominences

Interlacing threads of gas, in a complicated network, are now believed to make up the flame-like solar prominences. Because we can no longer believe that bright prominences are quite uniform in intensity, our concept of densities and pressures in prominences will probably have to be revised.

Careful records are being kept at Climax in the hopes of some day finding the key to the relation between activity on the sun and weather here on earth. There seems reason to believe that major storm cycles are initiated by



SNOW SLIDE—Dome of High Altitude Observatory, designed specially to study the sun's outer envelope without an eclipse, is shaped to shed snows.



CORONAGRAPH — The coronagraph is a specialized telescope of unusual design, and is utilized for obtaining artificial eclipse photographs of the sun's corona and prominences.

air movements stimulated by sudden changes in solar radiation. Some day storms on earth may be forecast weeks in advance from a knowledge of storms on the sun.

The sun is eclipsed so infrequently and for such brief periods that astronomers interested in studying it in the past were greatly handicapped. But had the moon been a bit smaller or a little farther away, we might not have known about the prominences and corona at all. The moon would have been unable to produce a total eclipse.

Today the sun's corona is studied daily through use of a coronagraph, invented in 1930 by Dr. Bernard Lyot of France. A metal disk in the telescope blots out the sun just as the moon does during a total eclipse, making it possible to see the surrounding bright gases.

Several coronagraphs are actively in use. Dr. Lyot operates a powerful one high on the Pic du Midi in the Pyrenees. Dr. Max Waldmeier installed one at Arosa in Switzerland. Through Dr. Donald H. Menzel, Harvard College Observatory in 1940 established on the Continental Divide at Climax the only coronagraph in the Western Hemisphere.

The sun's outer envelope, extending into space hundreds of thousands of miles during a total eclipse, appears as a faint pearly halo of light. This greenish-white nebulous atmosphere is about half a million times less brilliant than the sun and its total light a little less than that of the full moon.

To blot out the light of the solar disk and photograph the faint envelope of the sun is no simple task. Face an ordinary camera toward the sun and the picture is usually marred by a series of streaks and blots. These defects are due to reflections between the lenses and from the sides of the camera walls. In a telescope designed specially to study the sun's corona all such reflections must be eliminated or reduced to a minimum.

Until a decade or so ago, a man-made eclipse of the sun was considered a physical impossibility. Ordinary astronomical instruments diffused many hundreds of times the amount of light that the corona radiated into them, and obliterated all traces of the luminous gases in the faint solar atmosphere.

A metal disk at the main focus of the coronagraph, miracle instrument that does produce an eclipse, blots out the sun. A second lens, well behind the disk, reimages the surrounding sky with prominences, spicules and corona. To eliminate light scattered from the edge of the objective lens, a third lens is introduced just behind the occulting disk. This focuses the light upon the camera lens so that the edges can be blocked out with a diaphragm.

Dust-Free Lens

The lens must be entirely dust-free, for each tiny spot on the lens scatters light profusely and shines like a brilliant star. A dusty lens will send far more extraneous light to the plate than is found in the entire corona.

Ordinary brushing or wiping the lens charges the surface with static electricity, causing the dust particles to cling tenaciously. So oil from the human skin is used—with a well-washed finger oil from a well-washed nose is applied to a few spots on the surface of the glass. Then a clean, soft cloth is used to spread the oil over the surface. Babies' diapers were found excellent for this use. When this simple film of face-grease entirely covers the surface, dust particles slide away when you blow.

To be effective, a coronagraph must be installed in an atmosphere as nearly free of dust as possible. Thus observatories having this unique telescope are located high in the mountains. At Fremont Pass the stars shine so brightly on cloudless nights that with the naked eye you can see many seventh-magnitude stars, far too faint to be spotted at sea level.

The observatory itself is unheated, even in sub-zero weather. It has a cone-shaped roof, designed to shed the frequent heavy snows. The house and working spaces are electrically heated so that smoke or warm air from a furnace chimney will not impair observations.

Another coronagraph, larger than the present one and designed for even higher magnification of fine details, is being built and probably will be put into operation at the High Altitude Observatory early in 1948. The old instrument will then be used as a pilot telescope, while the new one will be employed to study radiations of hydrogen, helium and half-stripped iron atoms in the solar corona. When a prominence rises so high above the sun that it would disappear from the present instrument, as happened early last June, the activity of the gases can be captured with the new telescope.

Astronomers hope that within another decade or two a world-wide chain of coronagraphs will permit the behavior of the sun to be watched at all times as if there were a perpetual eclipse. Much remains to be learned about our nearest star.

The coronagraph, which permits the faint light of the corona to be observed regularly, is ideal for most research. But so far only the bright inner portions of the sun's envelope have been visible. Eclipses will have to be relied upon for knowledge of the form and spectrum of the outermost layer. Astronomers will still travel half way around the world to observe the sun's faint outer atmosphere during a total eclipse.

Science News Letter, September 14, 1946

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Do You Know?

Red blood *corpuscles* contain little or no calcium.

A mechanical peanut *sheller* does the work of 300 men.

Kidney diseases rank high as cause of death from internal disorders in the United States.

Potatoes cooked with skins on retain more of their vitamin C content than those peeled before boiling.

The *Hessian fly*, a serious wheat pest, received its name from the belief that it was brought to this country by the Hessian soldiers of the Revolution.

The *umbrella octopus* has a membrane connecting almost to the tips of its eight arms which when spread serves as an efficient trap to enfold fish or crustaceans.

The tendency of persons to grind their *teeth* when high in airplanes has more to do with the dislodging of dental fillings than the high altitude.

As *food insurance* for the coming winter and spring, the Department of Agriculture is urging housewives to top the war record of 4,000,000,000 jars of canned food in one year.

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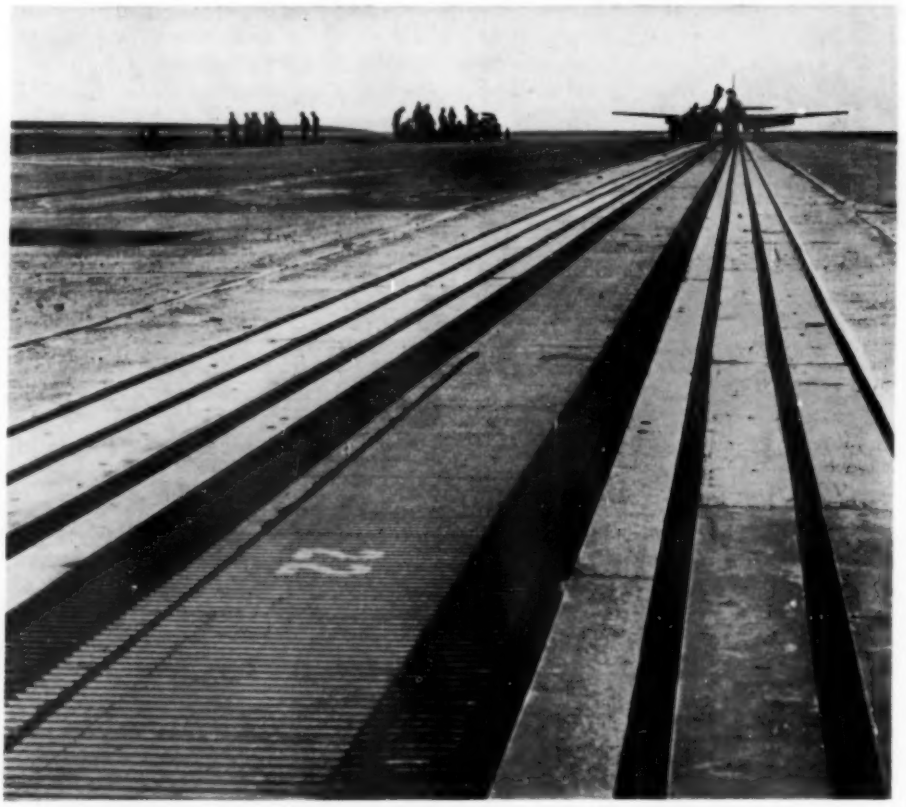


RUBBER BAND—Electric slingshot shoots planes into the air without the initial jarring shock of the conventional catapult. Shown in this Westinghouse photograph is the "roadbed" that provides the power for the shuttle car that is hitched to the plane.

AERONAUTICS

Electric Catapult Launcher

"Electropult," linear electric motor, launches jet planes with a run of 500 feet at 120 mph. It will make possible small, conveniently placed airports.

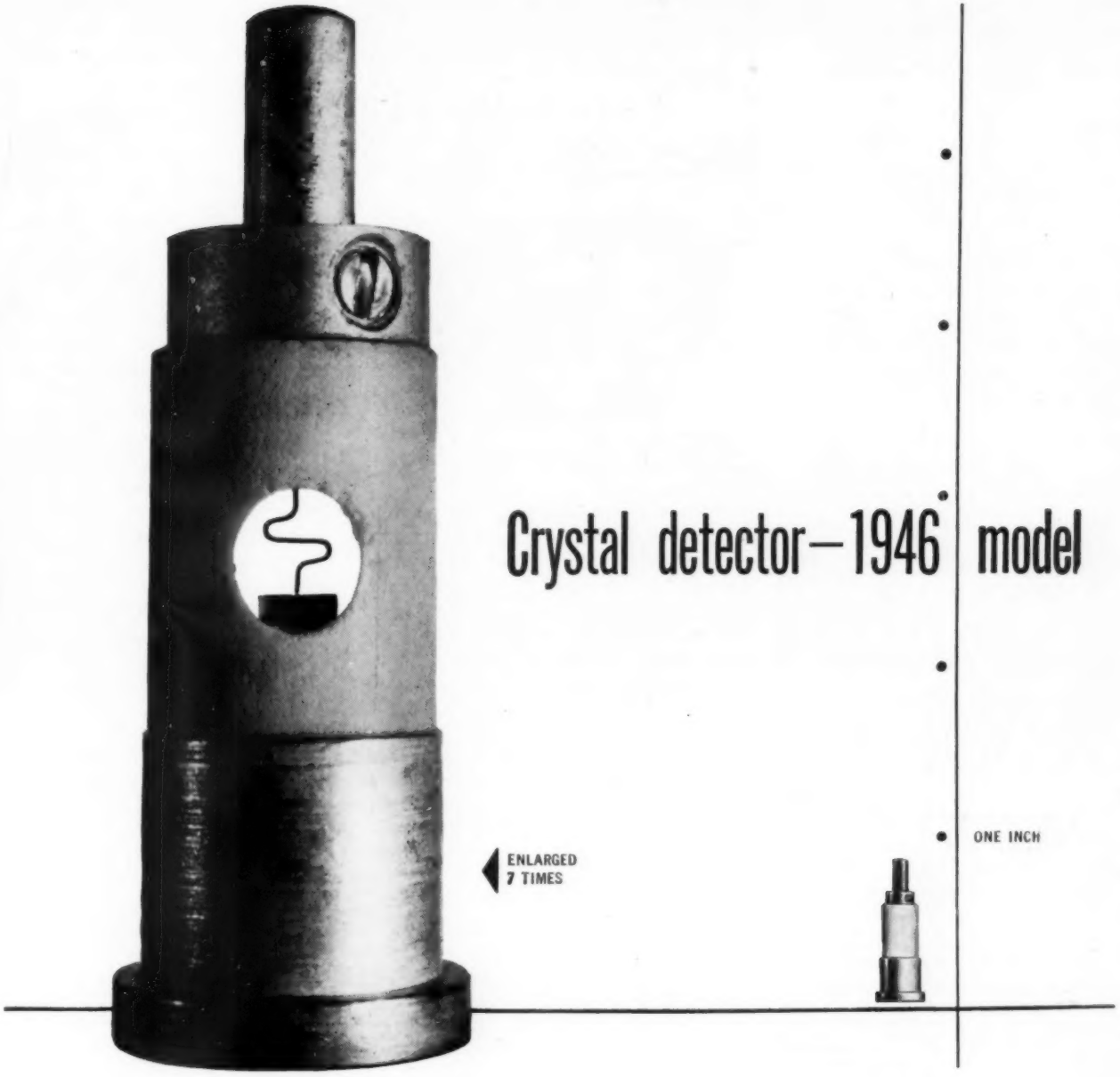
➤ ELECTRIC catapults that launch planes at high speed from a short runway have been revealed with predictions of small and revolutionary airports for future flying. Called the "electropult," the new catapult is a linear motor that has been installed at the Naval Air Test Center, Patuxent River, Md., and Mustin Field, Philadelphia.

M. F. Jones, project engineer for the Westinghouse Electric Corporation, who developed and built the electropult for the Navy, says that the new catapult will make possible floating airports, or seadromes, for refueling in midocean; barge-type airports at the water fronts of large cities; mid-city airports with an elevated "flight deck" several stories above the street; and the continued use of older airports requiring longer runways for bigger and faster planes.

Laid out flat along the ground, the electropult has a quarter-mile-long track. Planes are attached to a small car that runs on the track at high speeds.

Running free without a load, the car has reached a speed of 226 miles per hour in less than 500 feet. Attached to a plane, the car has sent off a jet fighter plane at 116 miles per hour in a run of 340 feet, compared with the plane's normal run of about 2,000 feet.

Delivering its power in a straight line instead of the usual rotating pattern, the electropult has what would normally be the rotor of a motor in the track, while the coils and steel cores of the stator are carried in the car. (*Cont'd on page 175*)



Crystal detector—1946 model

Remember the crystal detector in the first radios—hunting for the right spot with a cat's whisker? For years the detector lay discarded in favor of the vacuum tube. But when microwaves came, and with them the need to convert minute energy to amplifiable frequencies, a Bell Laboratories scientist thought back to the old crystal.

Silicon of controlled composition, he discovered, excelled as a microwave detector. Unlike the old-style natural crystals, it was predictable in performance, stable in service. From 1934 to Pearl Harbor, the Laboratories developed silicon units to serve microwave research.

Then Radar arrived. The silicon crystal came into its own, and found application in long-distance microwave Radar. Working with American and British colleagues, the Laboratories rapidly perfected a unit which the Western Electric Company produced in thousands. It became the standard microwave detector.

Crystal detectors are destined to play a big role in electric circuits of the future. They will have an important part in Bell System microwave radio relay systems. In various forms, they may reappear in radio sets. Here again Bell Laboratories' research has furthered the communication art.

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CHEMISTRY

War Super-Explosive Sets Off Dynamite Blasts

➤ RDX, super-explosive that powered blockbuster bombs and bazooka rocket projectiles, has been given a peacetime job. Too violent to be used directly as a blasting explosive, it will be used in the caps that set off dynamite charges.

The new RDX caps are only one and one-eighth inches long and less than a quarter of an inch in diameter. They are said to be the smallest blasting caps ever made.

In use, a hole is dug in one end of a dynamite stick and the cap inserted in it. When the cap is detonated, the violent shock of its explosion in turn detonates the dynamite.

Science News Letter, September 14, 1946

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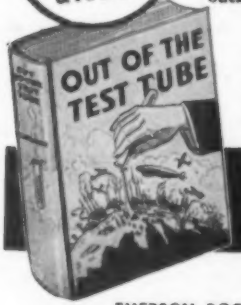

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ZOOLOGY

NATURE RAMBLINGS by Frank Thone

Bedtime for Bears

➤ BEARS are beginning to go into winter quarters now up in Canada, and at the higher altitudes of their range in our own Rockies. At lower latitudes and altitudes they will remain active for a few weeks longer, but by the time snow flies they all will have retired for the winter. Only in the hammocks and canebrakes of the Gulf Coast region are you likely to find bears on the prowl the year round.

This long winter drowse of the bears is usually called hibernation. Actually, however, it is not true hibernation, claims J. R. Matson (*Journal of Mammalogy*, Aug.). True hibernation, such as is found in ground squirrels and marmots, is a state of death-like sleep, wherein the animal's breath and pulse almost stop and its temperature drops to a point very little above that of its environment. An animal in this state is exceedingly difficult to arouse: pinch it, poke it, even stick pins in it, and it just continues to lie limp as the proverbial dishrag.

A bear in its winter sleep is quite different, Mr. Matson points out. It breathes at about the normal rate for any sleeping animal and its body temperature remains high enough to melt snow that may sift down on its fur. It is not particularly difficult to arouse, and it may even wake up of its own accord and emerge for a shorter or longer period. This kind of winter sleep, he contends, should be called dormancy rather than hibernation.

Mr. Matson also has his own theory to account for the winter sleep, or dormancy, of bears. In his rather extensive experience as a bear hunter, he has frequently observed that bears retire for the winter before winter really sets in—that they may be found settled down for their long sleep while the weather is still rather mild and there is plenty of food available in the woods.

Invariably, he states, bears "going to roost," before cold weather comes are very fat. The winter-prowlers, he says, are very likely to be animals that did not succeed in putting enough fat on their ribs to induce a tendency to become dormant.

There is an internal index to this physiological drowsiness, he states. In dressing fat bears killed at the beginning of winter, he has found the stomach empty and contracted into a tight, hard knot, into which it would be impossible to get any more food. Apparently when the bear reaches a certain state of fatness it just becomes unable to eat anything more, so all there is left to do is sleep.

Science News Letter, September 14, 1946

BOTANY

Chemical War on Weeds Requires Varied Weapons

➤ PLANNING chemical warfare against weeds requires a good deal of botanical know-how, Prof. A. S. Crafts of the University of California College of Agriculture points out. Each plant family has its vulnerable spots and also its special resistances to poisoning, and the chemical campaigner simply has to know what these are in any given combination of weeds to be killed and desirable plants to be spared.

Easiest and now most familiar case is killing dandelions in a lawn with 2,4-D. Dandelions have broad, flat, easily wetted leaves, and exposed, highly sensitive growing points. Grasses have narrow, upright leaves with water-resistant coatings, and their growing points are covered by the leaf-bases. So although 2,4-D actually is harmful to grass, the weak spray that can kill dandelions is shed by grass without particular damage.

Suppose a near-reversal of the lawn case: a truck-grower's field of lettuce or endive, which are near relatives of the dandelion, with wild grasses invading as weeds. Obviously, 2,4-D won't serve here; it would only kill the paying crop. But lettuce is chemically resistant to certain oils that kill grasses. So a different weapon is indicated.

There are scores of potential chemical weapons in the plant scientist's armory, says Prof. Crafts. But each one must be given its proving-ground test before being released for general use.

Science News Letter, September 14, 1946

From Page 172

Declaring that the electric catapult gains in effectiveness as the size of the plane to be launched increases, Mr. Jones said that designs are completed for electropults capable of launching the largest modern airliners. The largest airliner could be sent off at 120 miles per hour with a catapulted take-off run of 500 feet as opposed to the 4,000-foot runways needed without the launching device.

Passengers on planes launched by the electropult would be pressed back into their seats with a force about equal to their own weight, the engineer explained, adding that the discomfort would be about the same as lying in bed for a few seconds with the feet propped up in the air.

Mr. Jones predicted that the new launching system may eventually replace the hydraulic catapults used on U. S. World War II aircraft carriers.

The electropult was originally designed during the war to launch planes from small Pacific islands and was under construction when the war ended. The installation at Patuxent River has been set up on a 2,800-foot-long concrete runway 100 feet wide. More than 300,000 steel sheets were used in making the track core, while nearly 17,000 high resistance metal bars are fitted into slots in the steel core.

The turtle-like appearing car is 11.5 feet long and 3.5 feet wide. A steel cable, called a bridle, harnesses the plane to the car for the trip that launches the plane.

Riding the tracks on its own wheels, the plane is shot into the air when the car stops as flying speed is reached.

Science News Letter, September 14, 1946

INVENTION

Level Guides Accurately For Contour Farming

➤ A FARM machine of great potential importance is the subject of patent 2,405,634, granted to C. H. Batterman of Gering, Nebr. It is a device to guide the tractor driver who is trying to guide his furrows accurately along contour lines on sloping fields. It consists essentially of a wide U-tube filled with liquid, with glass sections permitting the operator to see changes in level. This is carried on a truss frame, the rear end of which is attached to the front of the tractor, while the front end rides a three-wheeled truck or dolley.

Science News Letter, September 14, 1946

Books of the Week

AMERICA'S FABRICS—Zelma Bendure and Gladys Pfeiffer—*Macmillan,* 688 p., illus., $10.00. The book tells the whole story of every basic fiber used in modern fabrics, including the new synthetics: the origins, individual characteristics and values of each, the different types of fabrics for which each fiber can be used, and the various finishes and dyes that can be applied to these fabrics.

DIRECTORY OF GEOLOGICAL MATERIAL IN NORTH AMERICA—J. V. Howell and A. I. Levorsen—*Am. Assoc. of Petroleum Geologists,* 111 p., $1.50. Vol. 30, No. 8, Part II.

FUN WITH PLASTICS—Joseph Lemming—*Lippincott,* 79 p., diagrs. and illus., $2.00. A beginner's book, with directions and designs for the new art of making jewelry, boxes, vases, toys and dozens of useful and attractive gifts from all kinds of plastic materials.

GENTLEMEN: YOU ARE MAD—Pierrepont B. Noyes—*Baxter Freres,* 79 p., $1.00. A book that draws an awesome parallel between the possible self-destruction of an earlier age, and the potential destruction that confronts mankind today through the uncontrolled release of atomic energy.

INJURY AND DEATH OF BACTERIA BY CHEMICAL AGENTS—Otto Rahn—*Biodynamica,* 183 p., tables, $3.60. A book discussing the study of the action of that group of substances which stop, delay, or otherwise impede the activity of bacteria.

THE LIMITATIONS OF OPTICAL IMAGE FORMATION—Max Herzberger—*The New York Academy of Science,* 30 p., 75 cents. Vol. XLVIII, Art. I.

NOT BY BREAD ALONE—Vilhjalmur Stefansson—*Macmillan,* 339 p., $3.50. This book tells of the experiences and adventures of Arctic explorers, fur trappers, Indians, and soldiers, who have thrived on an exclusive diet of meat or fish, or meat and fish. It is a study of the least understood of the three main diets by which men have lived.

THE POPULATION OF THE SOVIET UNION: History and Prospects—Frank Lorimer—*Columbia Univ. Press,* 289 p., tables, $4.00. Series of League of Nations Publications: II. Economic and Financial, 1946. II. A. 3.

SEX, MARRIAGE AND FAMILY—Thurman B. Rice, M.D.—*Lippincott,* 272 p., $2.50. This book discusses in detail every aspect of marriage—the basic sexual relationship, psychological and economic factors, children, inlaws, the physical, mental and emotional changes wrought by time and custom, and the special hazards that beset even the steadiest in these days of shifting values.

TOWARD MENTAL HEALTH—George Thorman—*Public Affairs Committee,* 32 p., illus., paper, 10 cents. The pamphlet tells in everyday terms, the story of nervous and mental diseases, including discussions on fear, nervous indigestion, moodiness, and other emotional sickness. Public Affairs Pamphlet No. 120.

THE WEATHER—George Kimble and Raymond Bush—*Penguin,* 185 p., illus. and tables, 25 cents. A handy book of information for the sportsman, the vacationer, the sailor, the gardener, or the farmer, and the man in the steet. It gives an insight into how the professional weather forecaster works; it also tells how the ordinary person can read the weather signs and become a fairly useful forecaster himself.

THE WORLD OF NUMBERS—Robert McKay—*Macmillan,* 198 p., diag., $2.50. A book written not for mathematicians, but for that large public that enjoys the odd facts and fancies that are connected with numbers, measurements and calculations.

Science News Letter, September 14, 1946

DENTISTRY

Teeth Need Three Minutes Of Brushing Every Day

➤ IN SPITE of all the admonitions about the importance of keeping the teeth clean and how to brush them which the average American gets from early childhood from parents, teachers, dentists and advertising, he does not do as good a job of toothbrushing as dentists advise.

This appears from a study of toothbrushing habits reported by Dr. Hamilton B. G. Robinson of the College of Dentistry, Ohio State University, in the *Journal of the American Dental Association* (Sept.).

The average American, he finds, takes about 267 strokes to brush his teeth but almost never brushes the sides next to the tongue. The crosswise method of brushing, universally condemned by dentists, is still used by one out of three persons. Time spent for brushing the teeth averages 67 seconds instead of the three minutes advised by dentists.

Science News Letter, September 14, 1946

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•New Machines And Gadgets•

⚙ *PORTABLE REFRIGERATOR for picnics uses dry-ice as a refrigerant. The small trunk-like box has compartments for food, one compartment for the solid carbon dioxide, and another in which water is frozen into ice cubes. Suitable ducts for the flow of the carbon dioxide gas are provided.*

Science News Letter, September 14, 1946

⚙ *MINIATURE MOTORS for the model airplane builder are true pulse-jet engines weighing one pound. A fuel nozzle mixes air and gasoline in a combustible mixture which enters the combustion chamber through a valve and is ignited by heat remaining from previous explosions. Battery, coil and spark plug give starting ignition.*

Science News Letter, September 14, 1946

⚙ *NIGHT LIGHT, to illuminate the face of a clock or other objects, is a flat, polished plate on which the objects are set, and which has tiny neon tubes inserted under hoods on one edge. The light is not strong enough to disturb sleep.*

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⚙ *BOWLING PIN that whistles when traveling after being struck, has a higher center of gravity and added resilience. It is the ordinary pin with a hole bored upward from the center of its base, and a small air passage from this to the neck of the pin. The large hole contains cork or other resilient material.*

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⚙ *PLASTIC SHIELD that fits over the body, as shown in the picture, stimulates breathing by artificially raising and lowering the chest. The entire unit, with two extra shields of different sizes, is portable and can be operated by one person. It is a lightweight "iron lung."*

Science News Letter, September 14, 1946

⚙ *KITCHEN SCRAPER, to clean pots and pans, uses the familiar scalloped edge bottle cap as a tool. It consists of a knob handle attached to an enlarged base which has a cavity on its lower side into which a cap fits tightly.*

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⚙ *FRUIT PICKER'S apparatus is an arched frame mounted on wheels, large enough to straddle a tree, and light enough to be pushed from tree to tree. Movable ladders are attached to the frame and can be swung around the tree where needed.*

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If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 328. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

Science News Letter Circulation Over 40,000

➤ THE PUBLISHER'S statement on the SCIENCE NEWS LETTER to the Audit Bureau of Circulations shows that for the period ending June 30, the total net paid circulation including bulk was 40,048. In addition there was a distribution of 1,443 additional copies, including 550 overseas edition subscriptions transferred to the weekly edition, when it became possible to send the weekly edition overseas.

Regular readers will find that their friends and colleagues will appreciate their thoughtfulness in calling attention to the value of receiving the SCIENCE NEWS LETTER regularly.

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Question Box

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BACTERIOLOGY

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ZOOLOGY

Do bears really hibernate? p. 174.

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